

WHAT IS CLAIMED IS:

1.           A disk array comprising:
  - a disk array rack;
  - a plurality of disk drives installed in the disk array rack;
  - a controller installed in the disk array rack to control data reads and writes to and from the disk drives; and
  - cables connecting the controller with the disk drives;
  - wherein the disk drives comprise first disk drives and second disk drives with an interface different from that of the first disk drives;
  - wherein the controller, when it decides that one of the first disk drives fails, performs sparing on the failed first disk drives by using the second disk drives.
2.           A disk array according to claim 1, wherein the interface of the first disk drives is a fibre channel interface and the interface of the second disk drives is a serial interface.
3.           A disk array according to claim 1, wherein the controller has:
  - a decision unit to determine whether or not to disable each of the disk drives based on the number of errors that occur in each disk drive during its read and write operations;
  - a sparing control unit to control sparing

processing which, when it is decided that a particular disk drive shall be disabled, assigns a part of the plurality of disk drives as spares for the disabled disk drive; and

an anomaly notification unit to notify an occurrence of the disabled state to a predetermined notification destination at a predetermined notification timing;

wherein the anomaly notification unit sets the notification timing so that the anomaly notification resulting from the sparing processing performed between the disk drives of different kinds is issued earlier than the anomaly notification resulting from the sparing processing performed between the disk drives of the same kind.

4. A disk array according to claim 3, wherein the sparing control unit gives priority to an execution of the sparing processing between the disk drives of the same kind over an execution of the sparing processing between the disk drives of different kinds.

5. A disk array according to claim 3, wherein the anomaly notification unit sets the notification timing based on at least the number of disabled disk drives or the number of disk drives available for the sparing processing.

6. A disk array according to claim 3, wherein the anomaly notification unit can also notify other troubles than the disabled state in the disk array and,

when a trouble occurs before the notification timing is reached, notifies the trouble along with the disabled state.

7. A disk array according to claim 3, wherein the sparing control unit controls an allocation of the disk drives during the sparing processing performed between the disk drives of different kinds so as to compensate for a characteristic difference between the different kinds of the disk drives.

8. A disk array according to claim 7, wherein the disk drives include two kinds of disk arrays, fibre channel disk drives with a fibre channel interface and serial disk drives with a serial interface, and

the sparing control unit, when it disables one of the fibre channel disk drives, allocates a plurality of the serial disk drives parallelly to the disabled fibre channel disk drive.

9. A disk array according to claim 7, wherein the disk drives include two kinds of disk arrays, fibre channel disk drives with a fibre channel interface and serial disk drives with a serial interface, and

the sparing control unit, when it disables one of the serial disk drives, allocates a plurality of the fibre channel disk drives serially to the disabled serial disk drive.

10. A disk array according to claim 3, wherein

the disk drives include two kinds of disk arrays, fibre channel disk drives with a fibre channel interface and serial disk drives with a serial interface,

the cables are fibre channels, and

the serial disk drives have their serial interface connected to the fibre channels through a converter that converts the serial interface into the fibre channel interface.

11. A disk array according to claim 10, further comprising:

a plurality of the controllers and a selector;

wherein the controllers are interconnected through the fibre channel cables and also connected with individual disk drives to form a plurality of fibre channel loops;

wherein the selector is disposed between the serial disk drives and the fibre channel cables and switches connection destinations of the serial disk drives between the plurality of fibre channel loops.